

## AMENDMENTS

### AMENDMENTS TO CLAIMS

This Listing of Claims replaces all previous listings, and versions, of claims in the application.

### Listing Of Claims

1 – 116 (canceled).

117. (currently amended) An optical tracking and processing system configured for communication with a visual display device, the visual display device being configured to display a virtual scene, the virtual scene being visually perceptible by at least one viewer, said system comprising:

a plurality of reference optical data sources each located at respective of a plurality of stationary reference locations spaced apart in a real-world physical environment, the real-world physical environment being suitable to accommodate a person for movement relative to the plurality of reference optical data sources, the plurality of reference optical data sources providing a set of reference optical data;

a portable housing adapted to be supported by a person, the portable housing when supported by a person being movable relative to the plurality of reference optical data sources upon motion of the person in the real-world physical environment;

a video capture device supported by the portable housing for movement in common with the portable housing relative to the plurality of reference optical data sources, the video capture device being configured to collect optical data, the video capture device providing collected video data, the collected video data including the set of reference optical data; and

at least one portable image analysis processor supported by the portable housing, the at least one portable image analysis processor being in communication with the video capture device, the at least one portable image analysis processor being configured to be provided on at least a near real-time basis at least the set of reference optical data, the at least one portable image analysis processor being configured to perform at least one means for performing a series of image analysis processes preprocessing steps using at least the set of reference optical data, the at least one portable image analysis processor providing on at least a near real-time basis at least one set of analyzed optical data, the at least one set of analyzed optical data including real-world tracking information, the real-world tracking information corresponding to movement of the video capture device relative to the plurality of reference optical data sources, to calculate, utilizing data received from the video capture device, change in orientation of the device, change in position of the device, or a combination of both change in orientation and position of the device; and

a wireless communication link, the wireless communication link including a portable wireless transmission unit supported at the portable housing, the wireless transmission unit being in communication with the at least one image analysis processor to receive the at least one set of analyzed optical data, the wireless transmission unit being operable to transmit wireless transmissions, the wireless transmissions conveying from the wireless transmission unit according to a wireless communication protocol the at least one set of analyzed optical data, the wireless communication link including a wireless receiving unit spaced apart from the wireless transmission unit, the wireless receiving unit being configured to receive the wireless transmissions, the wireless transmissions conveying to the wireless receiving unit on at least a near real-time basis the at least one set of analyzed optical data; and

a stationary processing unit in communication with the wireless receiver to receive the at least one set of analyzed optical data, the stationary processing unit including at least one stationary processor configured to perform at least one series of processing steps using the at least one set of analyzed optical data, processing of the at least one set of analyzed

optical data providing on at least a near real-time basis virtual scene tracking information, the stationary processing unit being configured to provide for communication to the visual display device virtual scene information, the virtual scene information having incorporated therein the virtual scene tracking information, the virtual scene tracking information relating to at least one changeable characteristic of the virtual scene, the at least one changeable characteristic of the virtual scene being capable of change on at least a near real-time basis in relation to the real-world tracking information

~~optionally means of wirelessly communication this information regarding change in orientation of the device, change in position of the device, or a combination of both change in orientation and position of the device to an external device responsive to said information.~~

118. (currently amended) The system of claim 117 and further comprising at least one of the following:

~~(a) wherein the plurality of reference optical data sources is selected from the following:~~

~~a plurality of high contrast passive targets each placed at respective of the fixed reference locations, and~~

~~a plurality of fixed intensity light sources; predetermined coordinates where said targets consist of white squares or spots on a black background or retroflective spots on a background surface of generally lower reflectivity or equivalent high contrast combination so as to provide high contrast points of reference to the video capture device; and~~

~~(b) a plurality of fixed intensity light sources placed at predetermined coordinates so as to provide high contrast pints of reference to the video capture device, whereby relative angular and spatial data can be determined by the system.~~

119. (currently amended) The system of claim 117 further comprising:

~~(a) wherein the plurality of reference optical data sources includes a plurality of retroflective targets each placed at respective of the fixed reference locations.~~

~~predetermined coordinates; a plurality of on axis light sources strobed in synchronization~~

~~with a capture rate of the video capture device; and means for computing absolute angular and spatial data based on the predetermined coordinates and relative angular and spatial data determined by the video capture device.~~

120. (currently amended) The system of claim ~~119~~ 117 and further comprising: a plurality of color filters positioned over the retroreflective targets whereby the ability of the system to correctly identify and maintain tracking of the individual retroreflective targets is improved.

wherein the plurality of reference optical data sources includes a plurality of on-axis light sources strobed in synchronization with a capture rate of the video capture device; and a processor configured to compute absolute angular and spatial data based on the fixed reference locations and relative angular and spatial data collected by the video capture device.

121. (original) The system of claim 119 wherein the light sources are color-controllable, whereby the ability of the system to correctly identify and maintain tracking of the individual retroreflective targets is improved.

122. (original) The system of claim 120 wherein the light sources are color-controllable, whereby the ability of the system to correctly identify and maintain tracking of the individual retroreflective targets is further improved.

123. (previously presented) The system of claim 117 further comprising:

(a) a plurality of controllable light sources synchronized with a capture rate of the video capture device; and

(b) means for utilizing at least one of pulse timing and color of light to transmit spatial coordinates of each beacon to the video capture device;

whereby relative angular and spatial data can be determined by the device and converted into absolute angular and spatial data.

124. (previously presented) The system of claim 117 further comprising a plurality of bi-directional infrared beacons for communicating a unique ID code with the video capture device.

125. (currently amended) The system of claim 117 further comprising:

~~(a) optical imaging means for monitoring a visual pattern on a ceiling;~~  
~~(b) a plurality of fluid tilt or other~~ at least one gravimetric sensor supported by the housing, the at least one gravimetric sensor being adapted to provide vertical orientation tracking information relating to the housing. gravity sensitive sensors; and means for determining relative spatial movement and azimuth via an output of the optical imaging means and for determining pitch and roll via an output of the fluid tilt or other gravity sensitive sensors.

126. (currently amended) The system of claim 117 further comprising a means of ~~setting~~ establishing at least one of the following:

an arbitrary reference orientation,

an arbitrary reference position, ~~or~~ and

a combination of both an arbitrary reference orientation and an arbitrary reference position of the portable housing device ~~either automatically or by user control~~ so as to create a reference point from which changes of the same ~~in orientation of the device, changes in position of the device, or a combination of both changes in orientation and position of the device~~ can be compared.